

Box Plots						
Data Mode:Original						
Facility:BENCHMARK		Benchmark Datasets				
Permit Type:Detection						
Constituent:Cu		Copper, total				
Starting:Jan 01, 1995		Ending:Oct 01, 1995				
Data Mode:Original						
Test:Observations						
Well ID	25th %Tile	Median	75th %Tile	Std Dev	IQR	
BG-1	2.500	2.500	6.300	2.179	3.800	
BG-2	2.500	4.200	7.525	2.767	5.025	
CW-1	3.425	7.000	9.750	3.306	6.325	
CW-2	2.500	2.500	4.825	1.550	2.325	
BG-3	2.500	2.500	4.675	1.680	2.175	

Figure 5-44. The Percentile Summary.

Each row of the Percentile Summary shows the 25th Percentile, Median, 75th Percentile, Standard Deviation and Interquartile Range (IQR) for a selected well. Use the up and down arrow keys to scroll through the Percentile Summary. Press <Enter> to proceed.

1. The following options appear at the bottom of your screen: CONTINUE, PRINT and PLOT.

PRINT Option

To print the Percentile Summary use the left and right arrow keys to highlight the PRINT option and press <Enter>.

PLOT Option

To proceed to the Box Plot use the left and right arrow keys to highlight the PLOT option and press <Enter>. A Box Plot appears on your screen as shown in Figure 5-45.

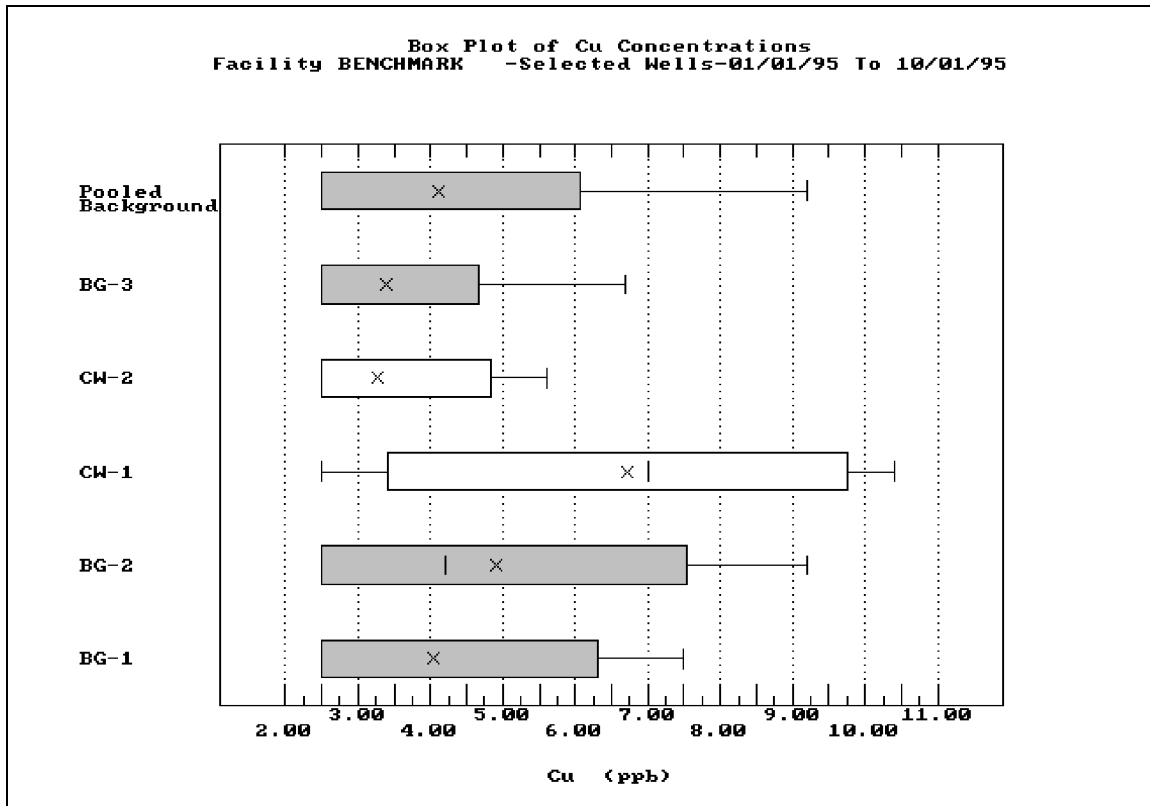


Figure 5-45. Box Plot produced with the Methods | Variance | Box Plots option.

The X on each Box Plot marks the location of the mean. The * on each Box Plot marks the location of the median. Box Plots for background wells and pooled background data are shown in blue (shaded in Figure 5-45). Box Plots for compliance wells are shown in red.

To print the Box Plots follow the instructions in Section 5.5.3.3.

Press <Esc> to return to the Percentile Summary.

CONTINUE Option

To close the Box Plots dialog and return to the Methods | Variance menu highlight the CONTINUE option and press <Enter>.

5.7 GRITS STATISTICS Intervals Module Methods

The **GRITS Statistics Intervals Module** contains the statistical intervals methods under the Methods | Intervals menu. The menu tree for the Intervals menu is shown in Figure 5-46.

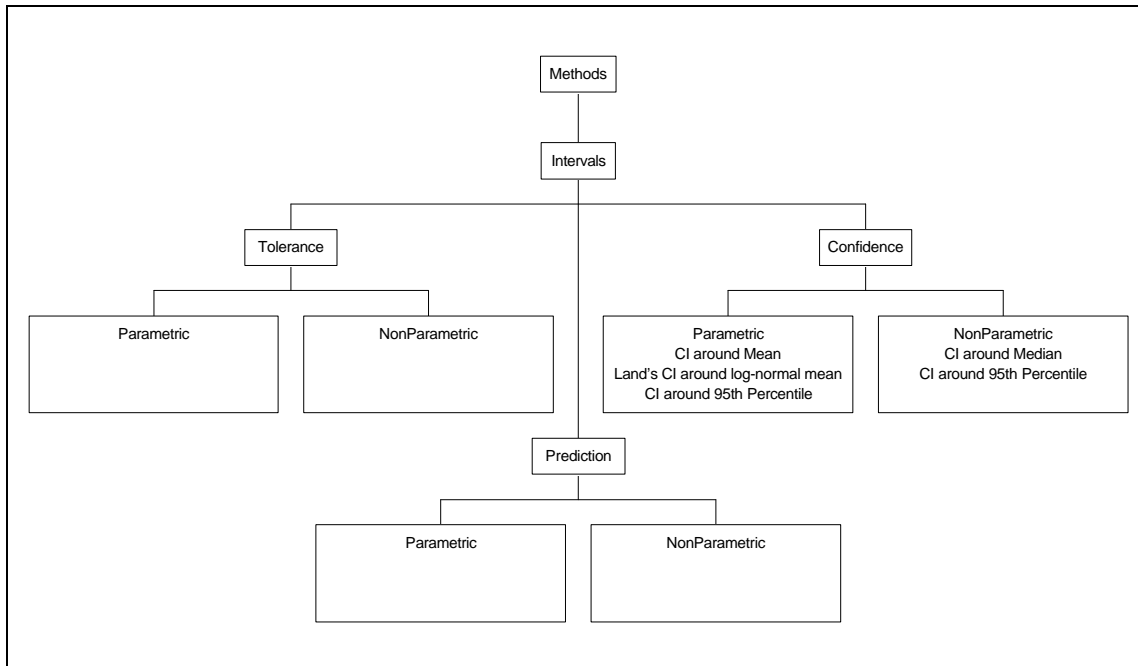


Figure 5-46. The **GRITS Statistics Intervals Module** Intervals menu tree. *Note:* This menu tree does not show the Normality and Variance options.

5.7.1 METHODS | INTERVALS | TOLERANCE | PARAMETRIC

The Methods | Intervals | Tolerance | Parametric option:

- Constructs a Parametric Tolerance Interval around user-specified data.

For statistical guidance consult Section 9.1 of *Statistical Analysis of Groundwater Monitoring Data: Unified Guidance*.

The instructions below assume that a data set is loaded.

1. At the GRITS Statistics menu press </>. This will take you to the top most level of the GRITS Statistics menu (Figure 5-12).
2. Press <M> to descend into the Methods menu.
3. Press <I> to descend into the Intervals menu.
4. Press <T> to descend into the Tolerance menu.
5. Press <P> to execute the Parametric option. The Parametric Tolerance Menu appears on your screen as shown in Figure 5-47.

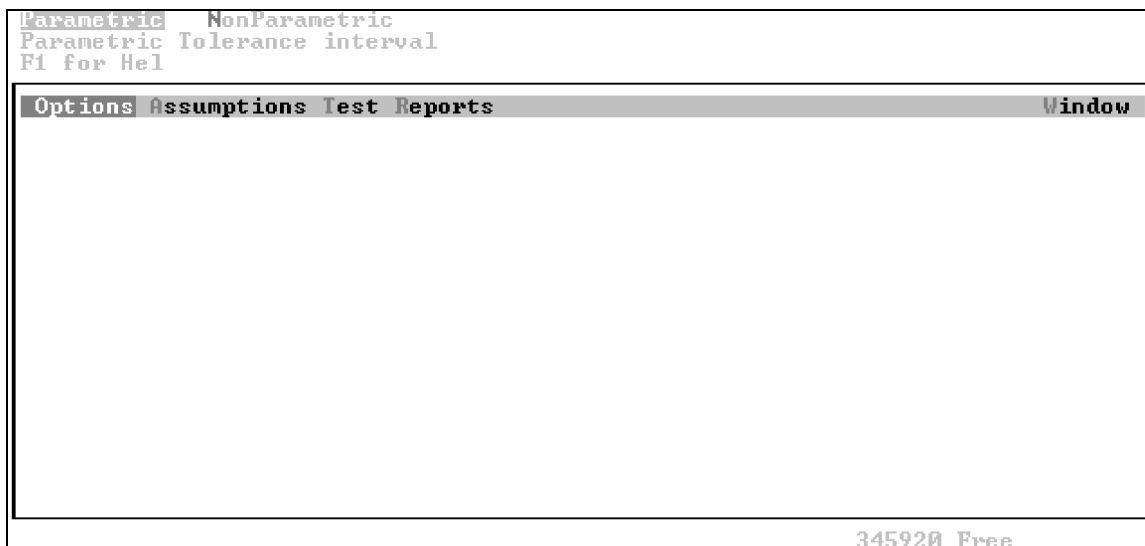


Figure 5-47. The Parametric Tolerance Interval Menu.

Table 5-7 lists menu navigation keys for interval menus. Tables 5-8 through 5-11 summarize the pull-down menus of the Parametric Tolerance Interval Menu.

Key	Action
< > Left Arrow	Highlight the item to the left.
< > Right Arrow	Highlight the item to the right.
< > Up Arrow	Highlight item above.
< > Down Arrow	Highlight item below. If the currently highlighted item has a pull-down menu attached it will be opened.
<Enter>	Executes the currently highlighted item. If the currently highlighted item has a pull-down menu attached it will be opened.
<Home>	Highlight the upper-left-most item.
<End>	Highlight the lower-right-most item.
<Esc>	If a pull-down menu is open it is closed and control is returned to the parent menu item. Otherwise, exits the statistical method and returns to the GRITS Statistics menu.

Table 5-7. Menu navigation keys for Interval Method menus.

Pull-Down	Menu Item	Description
-----------	-----------	-------------

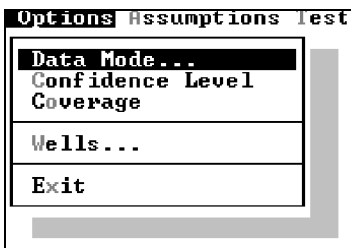


Figure 5-48. Parametric Tolerance Interval Menu Options pull-down.

Data Mode...



Figure 5-49. The Data Scale pop-up.

Allows you to select the scale (Original or Log Transform) the Tolerance Interval will be computed on.

Upon selection the Data Scale pop-up will appear on your screen (Figure 5-49). Use the up and down arrow keys to highlight the desired scale and press **<Enter>**.

If a Parametric Tolerance Interval has already been computed and the scale is changed via the Data Mode.... option the Tolerance Interval will automatically be re-computed on the selected scale.

Confidence Level

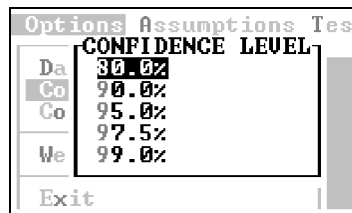


Figure 5-50. The Confidence Level pop-up for the Parametric Tolerance Intervals method.

Allows you to set the Confidence Level.

Upon selection the Confidence Level pop-up will appear on the screen (Figure 5-50). Use the up and down arrow keys to highlight the desired Confidence Level and press **<Enter>**.

If a Parametric Tolerance Interval has already been computed and the Confidence Level is changed the Tolerance Interval will automatically be re-computed with the new Confidence Level.

Coverage

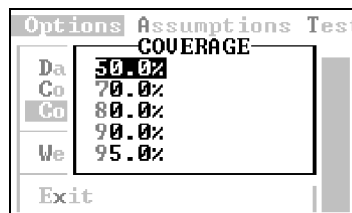


Figure 5-51. The Coverage pop-up.

Allows you to set the Coverage.

Upon selection the Coverage pop-up will appear on the screen (Figure 5-51). Use the up and down arrow keys to highlight the desired Coverage and press **<Enter>**.

If a Parametric Tolerance Interval has already been computed and the Coverage is changed the Tolerance Interval will automatically be re-computed with the new Coverage.

	<u>W</u> ells...	Allows you to toggle Well Selection Flags. See Section 5.5.3.2.
	E <u>x</u> it	Exits Parametric Prediction Intervals menu.

Table 5-8. Options pull-down menu items for Parametric Tolerance Intervals.

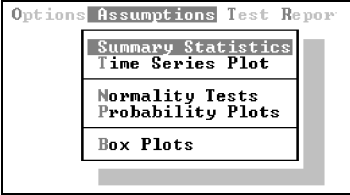
Pull Down	Menu Item	Description
	<u>S</u> ummary Statistics	The Summary Statistics option opens the Summary dialog (Figure 5-53):

Figure 5-52. The Assumptions pull-down menu.

The Summary Dialog

The Summary dialog provides the following statistics for each individual well, pooled background well, pooled compliance wells, and all wells:

- **N** Number of observations
- **ND** Number of Nondetects
- **%ND** Percentage of Nondetects
- **MEAN** Mean
- **STD DEV** Standard Deviation
- **SKEWNESS** Skewness
- **KURTOSIS** Kurtosis
- **MIN** Minimum
- **25th %TILE** 25th Percentile
- **MEDIAN** 50th Percentile or Median
- **75th %TILE** 75th Percentile
- **MAX** Maximum
- **Box Plot** A Box plot is drawn for each group. The X represents the group mean and the | represents the group Median.

Summary							
BACKGROUND WELLS							
WELL ID	N	ND	%ND	MEAN	STD DEV	SKEWNESS	KURTOSIS
BG-1	8	6	75.0	35.000	29.761	1.564	0.86
BG-2	8	5	62.5	43.125	36.541	1.276	0.35
	16	11	68.8	39.063	32.466	1.441	0.77
COMPLIANCE WELLS							
WELL ID	N	ND	%ND	MEAN	STD DEV	SKEWNESS	KURTOSIS
CW-1	8	2	25.0	131.250	100.915	0.113	-1.60
CW-2	8	6	75.0	33.750	31.595	2.072	2.57

Figure 5-53. The Summary dialog.

Use the < >, < >, < > and < > arrow keys to scroll through the Summary dialog. Press <Enter> or <Esc> to return to the Intervals Menu.

To return to the Summary dialog, execute the Windows option of the Intervals menu and use the up and down arrow keys to highlight Summary and press <Enter>. The Summary dialog will be brought to the top and activated.

Time Series Plot

The Time Series Plot option displays a Time Series plot that includes all selected wells.

This is equivalent to executing the PlotSelected option from the DataSet | View | Plot menu (Section 5.5.3).

	<u>N</u> ormality Tests	The Normality Tests option is equivalent to executing the <u>T</u> ests option of the <u>M</u> ethods <u>N</u> ormality menu (See Section 5.6.1).
	<u>P</u> robability Plots	The <u>P</u> robability Plots option is equivalent to executing the <u>P</u> lots option of the <u>M</u> ethods <u>N</u> ormality menu (See Section 5.6.2).
	<u>B</u> ox Plots	The <u>B</u> ox Plots option is equivalent to executing the <u>B</u> ox Plot option of the <u>M</u> ethods <u>V</u> ariance menu (See Section 5.6.4).

Table 5-9. The Assumptions pull-down menu items.

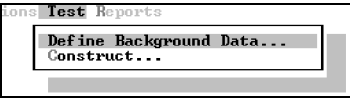
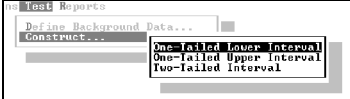
Pull-Down	Menu Item	Description
 <p>Figure 5-54. The <u>T</u>est pull-down.</p>	<u>Define Background Data...</u>	<p>The <u>Define Background Data...</u> option is used to select the background data that Tolerance Interval Limits will be computed on.</p> <p>To select the background data follow the instructions in Section 5.7.3.</p>
	<u>Construct...</u>  <p>Figure 5-55. The Interval Type dialog.</p>	<p>Use the <u>C</u>onstruct... option to select the type of Tolerance Interval to construct (i.e., one-sided upper, one-sided lower or two-sided).</p> <p>Upon selecting the <u>C</u>onstruct... option the Interval Type dialog appears (Figure 5-55). Use the up and down arrow keys to highlight the desired interval type and press <Enter>.</p>

Table 5-10. The Test pull-down menu items for the Parametric Tolerance Intervals method.


Pull-Down	Menu Item	Description
 <p>Figure 5-56 The Reports menu.</p>	<u>P</u> rint	Prints a textual report of the Parametric Tolerance Interval Results. See Section 5.7.9 for cprinting textual reports.
	<u>D</u> isplay	Displays Tolerance Interval results on a time series plot.

Table 5-11. The Reports pull-down menu for the Parametric Tolerance Intervals method.

- Table 5-12 shows the default settings for the Parametric Tolerance Interval Method. To change the Confidence Level and Coverage follow the instructions in Table 5-8 for the Options pull-down menu. To change the Interval Type follow the instructions in Table 5-10 for the Construct... option of the Test pull-down menu.

Option	Default Value
--------	---------------

Data Mode	The Parametric Tolerance Interval defaults to the same setting shown in the Scope window and set by the <u>D</u> ataSet <u>S</u> cope <u>D</u> ata <u>M</u> ode.
Confidence Level	95%
Coverage	95%
Interval Type	One-Tailed Upper

Table 5-12. Default Settings for the Parametric Tolerance Interval Method.

7. Select the Define Background Data... option of the Test menu (Table 5-10) to select the data that the Tolerance Interval Limits will be computed on. Follow the instructions in Section 5.7.3 to select the background data. Upon selection of background data the Tolerance Interval is computed and displayed in the Tolerance Intervals window (Figure 5-57).

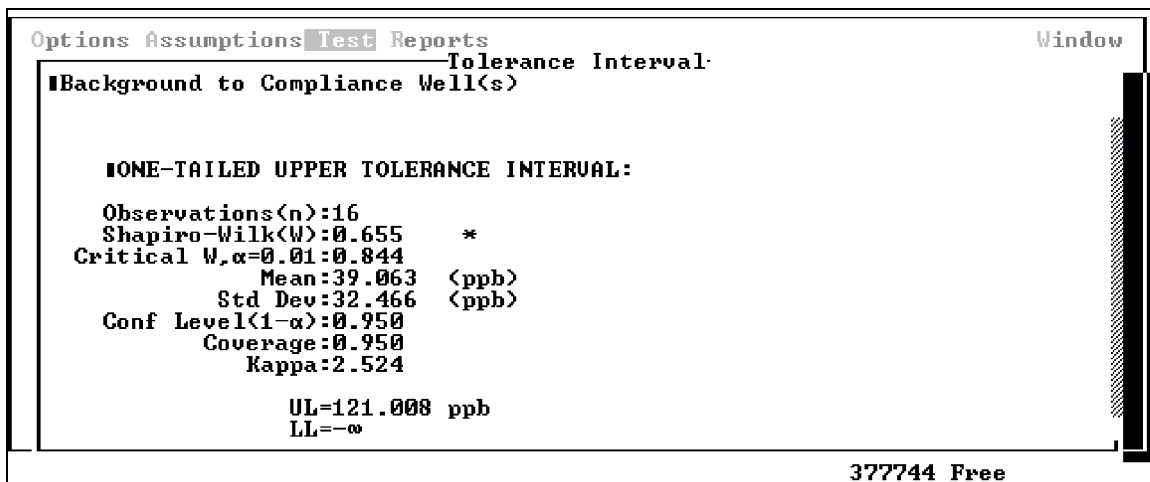


Figure 5-57. The Tolerance Interval Window.

8. Use the up and down arrow keys to scroll through the Tolerance Interval window. Press **<Enter>** to return the Parametric Tolerance Interval Menu. Table 5-13 summarizes the statistics shown in the Tolerance Interval window.

Statistic	Description																																																
Observations(n)	Number of background observations used to compute the Tolerance Interval Limits.																																																
Shapiro-Wilk(W) or Shapiro-Francia (W')	<p>If the number of observations (n) is less than 50 the Shapiro-Wilk W statistic is computed. If the number of observations n is 50 or more the Shairo-Francia W' statistic is computed.</p> <p>This value is flagged with an asterisk (*) if the data are not normally distributed at the 1% level of significance.</p>																																																
Critical W, $\alpha=0.01$	Critical value of W for n observations at the 1% level of significance.																																																
Mean	Mean of the background observations.																																																
Std Dev	Standard Deviation of the background observations.																																																
Conf. Level(1- α)	Confidence Level																																																
Coverage	Coverage																																																
Kappa	Standard Deviation multiplier																																																
UL	Upper Tolerance Limit																																																
LL	Lower Tolerance Limit																																																
Well Observations	<p>Remaining observations are listed by well. Observations that fall outside of the upper and/or lower Tolerance Limits are flagged with an asterisk (*) as shown in Figure 5-58.</p> <div><div>OptionsAssumptionsTestReports</div><div>Tolerance Interval</div><div>Window</div><div><div>■ WELL: CW-1</div><table><tr><td>CW-1</td><td>01/01/1995</td><td>100.000</td><td><ppb></td></tr><tr><td>CW-1</td><td>02/01/1995</td><td>ND<40.000</td><td><ppb></td></tr><tr><td>CW-1</td><td>03/01/1995</td><td>260.000</td><td><ppb>*</td></tr><tr><td>CW-1</td><td>04/01/1995</td><td>150.000</td><td><ppb>*</td></tr><tr><td>CW-1</td><td>05/01/1995</td><td>40.000</td><td><ppb></td></tr><tr><td>CW-1</td><td>06/01/1995</td><td>ND<40.000</td><td><ppb></td></tr><tr><td>CW-1</td><td>07/01/1995</td><td>210.000</td><td><ppb>*</td></tr><tr><td>CW-1</td><td>08/01/1995</td><td>250.000</td><td><ppb>*</td></tr></table><div>■ WELL: CW-2</div><table><tr><td>CW-2</td><td>01/01/1995</td><td>110.000</td><td><ppb></td></tr><tr><td>CW-2</td><td>02/01/1995</td><td>ND<40.000</td><td><ppb></td></tr><tr><td>CW-2</td><td>03/01/1995</td><td>ND<40.000</td><td><ppb></td></tr><tr><td>CW-2</td><td>04/01/1995</td><td>ND<40.000</td><td><ppb></td></tr></table></div></div>	CW-1	01/01/1995	100.000	<ppb>	CW-1	02/01/1995	ND<40.000	<ppb>	CW-1	03/01/1995	260.000	<ppb>*	CW-1	04/01/1995	150.000	<ppb>*	CW-1	05/01/1995	40.000	<ppb>	CW-1	06/01/1995	ND<40.000	<ppb>	CW-1	07/01/1995	210.000	<ppb>*	CW-1	08/01/1995	250.000	<ppb>*	CW-2	01/01/1995	110.000	<ppb>	CW-2	02/01/1995	ND<40.000	<ppb>	CW-2	03/01/1995	ND<40.000	<ppb>	CW-2	04/01/1995	ND<40.000	<ppb>
CW-1	01/01/1995	100.000	<ppb>																																														
CW-1	02/01/1995	ND<40.000	<ppb>																																														
CW-1	03/01/1995	260.000	<ppb>*																																														
CW-1	04/01/1995	150.000	<ppb>*																																														
CW-1	05/01/1995	40.000	<ppb>																																														
CW-1	06/01/1995	ND<40.000	<ppb>																																														
CW-1	07/01/1995	210.000	<ppb>*																																														
CW-1	08/01/1995	250.000	<ppb>*																																														
CW-2	01/01/1995	110.000	<ppb>																																														
CW-2	02/01/1995	ND<40.000	<ppb>																																														
CW-2	03/01/1995	ND<40.000	<ppb>																																														
CW-2	04/01/1995	ND<40.000	<ppb>																																														

Table 5-13. Tolerance Interval window statistics.

9. Use the **Reports | Print** option to print the Parametric Tolerance Interval results to a printer or ASCII file (Section 5.7.9).
10. Use the **Reports | Display** option to view a graphical representation of the Parametric Tolerance Interval results (Figure 5-59). Individual observations that fall outside of the Tolerance Interval Limits are marked with an asterisk (*).

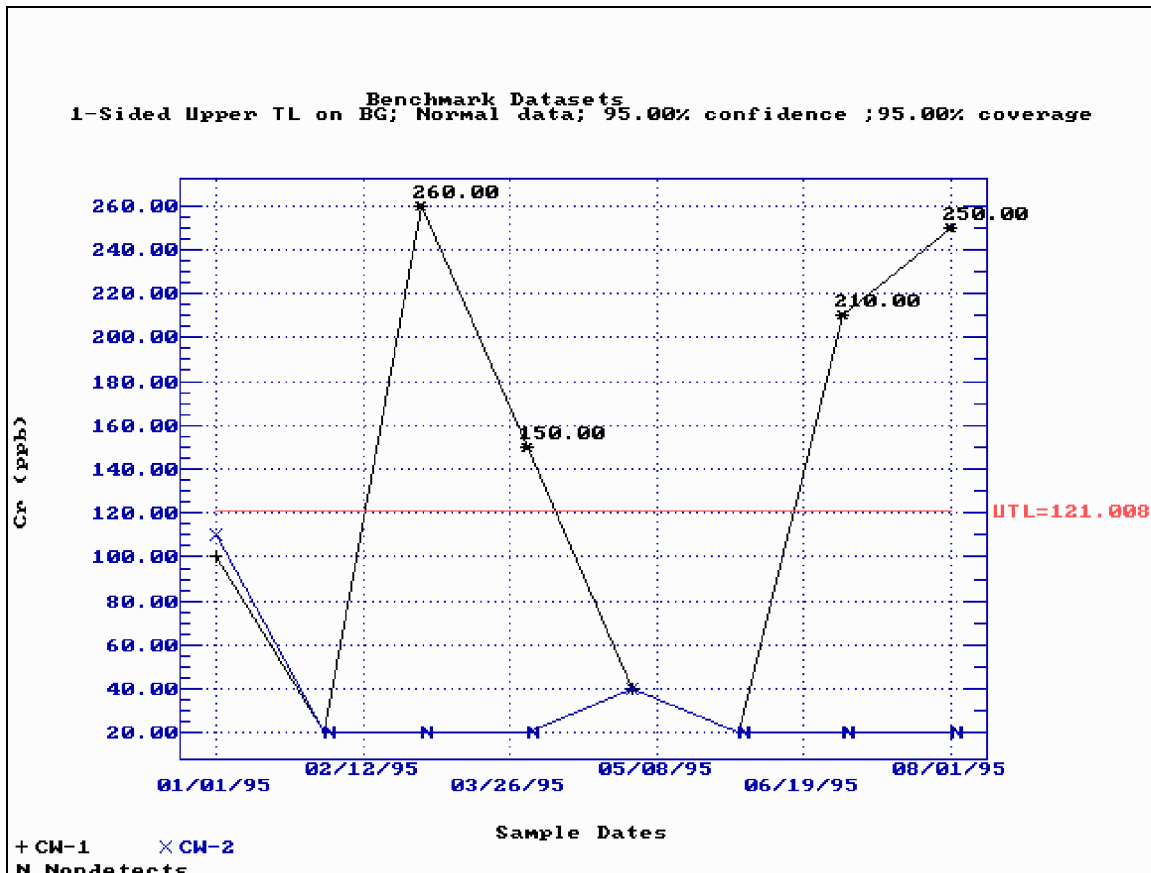


Figure 5-59. One-Sided Upper Tolerance Limit (UTL) superimposed on a time-series plot.

See Section 5.5.3.3 for instructions on printing the plot.

5.7.2 METHODS | INTERVALS | TOLERANCE | NONPARAMETRIC

The **Methods | Intervals | Tolerance | NonParametric** option:

- Constructs a Non-parametric Tolerance Interval around user-specified data.

For statistical guidance consult Section 9.1 of *Statistical Analysis of Groundwater*

Monitoring Data: Unified Guidance.

The instructions below assume that a data set is loaded.

1. At the GRITS Statistics menu press </>. This will take you to the top most level of the GRITS Statistics menu (Figure 5-12).
2. Press <M> to descend into the Methods menu.
3. Press <I> to descend into the Intervals menu.
4. Press <T> to descend into the Tolerance menu.
5. Press <N> to execute the Non-parametric option. The Non-parametric Tolerance Menu appears on your screen as shown in Figure 5-60.



Figure 5-60. The Non-parametric Tolerance Interval Menu.

6. The default settings for the Non-parametric Tolerance Interval Method are listed in Table 5-14.

Option	Default Value
Approximate Confidence Level	95%±10%
Coverage	95%
Interval Type	One-Tailed Upper

Table 5-14. Default settings for the Non-parametric Tolerance Interval Method.

To change the default settings for the Approximate Confidence Level and Coverage follow the instructions for the Options | Parameters menu item in Table 5-15.

To change the Interval Type (i.e., One-Tailed Upper, One-Tailed Lower, or Two-Tailed) follow the instructions in Table 5-10 for the Construct... option of the Test pull-down menu.

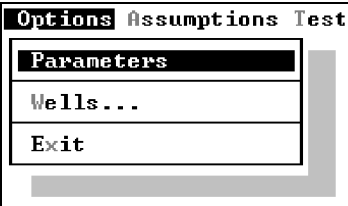
Pull-Down	Menu Item	Description
	<u>P</u> arameters	Set the Approximate Confidence Level and Coverage.

Figure 5-61. The Options pull-down menu.

Upon executing the **Parameters** option the message box shown in Figure 3-62 appears on your screen.



Figure 5-62. Message Box to inform users about Significance Levels in Non-parametric Intervals.

Computation of the Non-parametric Tolerance Interval is iterative. A list of possible Tolerance Intervals is constructed based upon the user-specified background data. The approximate Confidence Level is computed for each interval in the list. The Interval that comes closest to meeting the desired Confidence Level and/or Coverage is selected.

Press **<Enter>** to proceed to the **Set Parameters** dialog (Figure 5-63).

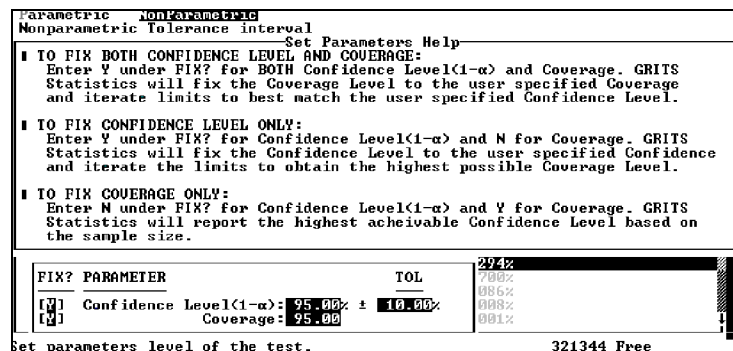


Figure 5-63. The Set Parameters dialog.

The Set Parameters dialog allows you to specify a desired Confidence Level and Coverage. By setting the **FIX?** fields you can control how the Tolerance Interval Limits are selected.

TO FIX BOTH CONFIDENCE LEVEL AND COVERAGE:

Type **<Y>** under **FIX?** for BOTH Confidence Level(1- ∞) and Coverage. GRITS Statistics will fix the Coverage Level to the user specified Coverage and iterate limits to best match the user specified Confidence Level.

TO FIX CONFIDENCE LEVEL ONLY:

Type **<Y>** under **FIX?** for Confidence Level(1- ∞) and **<N>** for Coverage. GRITS Statistics will fix the Confidence Level to the user specified Confidence and iterate the limits to obtain the highest possible Coverage Level.

TO FIX COVERAGE ONLY:

Type **<N>** under **FIX?** for Confidence Level(1- ∞) and **<Y>** for

	<u>W</u> ells...	Allows you to toggle Well Selection Flags. See Section 5.5.3.2.
	<u>E</u> xit	Exits the Non-parametric Tolerance Intervals menu.

Table 5-15. Menu items for the Options pull-down menu for the Non-parametric Tolerance Interval Method.

7. Select the Define Background Data... option of the Test menu (Table 5-10) to select the data that the Tolerance Interval Limits will be computed on. Follow the instructions in Section 5.7.3 to select the background data. Upon selection of background data the Tolerance Interval is computed and displayed in the Non-Parametric TI window (Figure 5-64).

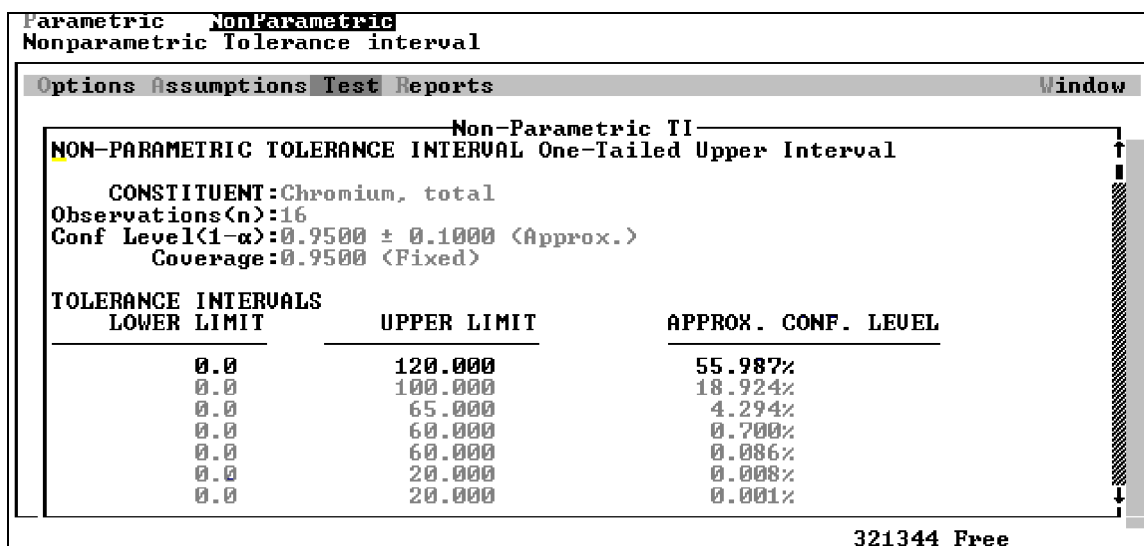


Figure 5-64. The Non-Parametric TI window.

8. Use the up and down arrow keys to scroll through the Non-Parametric TI window. Press <Enter> to return the Non-parametric Tolerance Interval Menu. Table 5-16 summarizes the statistic shown in the Non-Parametric TI window.

Statistic	Description
Observations(n)	Number of background observations used to compute the Tolerance Interval Limits.

Conf Level($1-\infty$)	Confidence Level Fixed and Coverage Fixed Desired Confidence Level \pm User Tolerance.																								
	Confidence Level Fixed and Coverage Not Fixed Fixed Confidence Level.																								
	Confidence Level Not Fixed and Coverage Fixed Not Displayed.																								
Coverage	Confidence Level Fixed and Coverage Fixed Fixed Coverage																								
	Confidence Level Fixed and Coverage Not Fixed Not Displayed																								
	Confidence Level Not Fixed and Coverage Fixed Fixed Coverage.																								
List of possible Tolerance Intervals	<p>A list of all possible Tolerance Intervals based on the user selected data is displayed under TOLERANCE INTERVALS. The selected interval is shown in bright white. All other intervals are shown in yellow.</p> <p>If the Coverage is fixed the Approximate Confidence Level is displayed for each possible interval as shown in Figure 5-64.</p> <p>If the Coverage is not fixed the Approximate Coverage is displayed for each possible interval as shown in 5-65.</p> <div><div>ParametricNonParametric</div><div>Nonparametric Tolerance interval</div><div><div>OptionsAssumptionsTest ReportsWindow</div><div><div>Non-Parametric TI</div><div>NON-PARAMETRIC TOLERANCE INTERVAL One-Tailed Upper Interval</div><div>CONSTITUENT:Chromium, total</div><div>Observations(n):16</div><div>Conf Level(1-α):0.9500 (Fixed)</div><table><thead><tr><th>TOLERANCE INTERVALS LOWER LIMIT</th><th>UPPER LIMIT</th><th>APPROX. COVERAGE</th></tr></thead><tbody><tr><td>0.0</td><td>120.000</td><td>82.930%</td></tr><tr><td>0.0</td><td>100.000</td><td>73.600%</td></tr><tr><td>0.0</td><td>65.000</td><td>65.612%</td></tr><tr><td>0.0</td><td>60.000</td><td>58.337%</td></tr><tr><td>0.0</td><td>60.000</td><td>51.557%</td></tr><tr><td>0.0</td><td>20.000</td><td>45.164%</td></tr><tr><td>0.0</td><td>20.000</td><td>39.098%</td></tr></tbody></table></div><div>313152 Free</div></div></div>	TOLERANCE INTERVALS LOWER LIMIT	UPPER LIMIT	APPROX. COVERAGE	0.0	120.000	82.930%	0.0	100.000	73.600%	0.0	65.000	65.612%	0.0	60.000	58.337%	0.0	60.000	51.557%	0.0	20.000	45.164%	0.0	20.000	39.098%
TOLERANCE INTERVALS LOWER LIMIT	UPPER LIMIT	APPROX. COVERAGE																							
0.0	120.000	82.930%																							
0.0	100.000	73.600%																							
0.0	65.000	65.612%																							
0.0	60.000	58.337%																							
0.0	60.000	51.557%																							
0.0	20.000	45.164%																							
0.0	20.000	39.098%																							
Well Observations	Remaining observations are listed by well. Observations that fall outside of the upper and lower Tolerance Limits are flagged with an asterisk (*) as shown in Figure 5-58.																								

Table 5-16. Non-Parametric TI window statistics.

9. Use the **Reports | Print** option to print the Non-Parametric Tolerance Interval results to a printer or ASCII file (Section 5.7.9).
10. Use the **Reports | Display** option to view a graphical representation of the Non-Parametric Tolerance Interval results (Figure 5-66). Individual observations that fall outside of the Tolerance Interval Limits are marked with an asterisk (*).

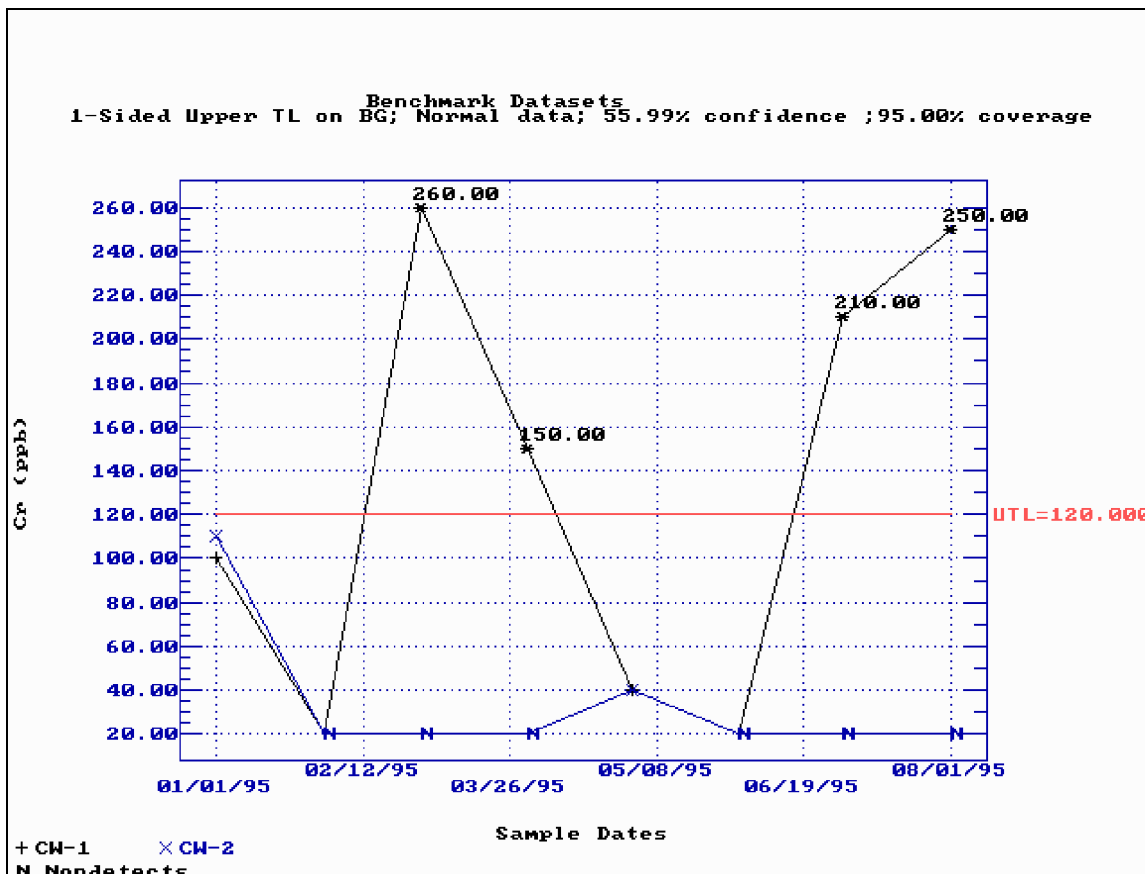


Figure 5-66. One-Sided Upper Tolerance Interval (UTL) superimposed on a time series plot.

5.7.3 SELECTING BACKGROUND DATA FOR TOLERANCE INTERVALS

The Parametric and Non-parametric Tolerance Interval methods in the **GRITS Statistics Intervals Module** use the same data selection dialogs to select the Background data on which to construct intervals. Follow the instructions below for the **Define Background Data...** item of the **Test** pull-down menu.

1. The Data Source dialog shown in Figure 5-66 appears on your screen.

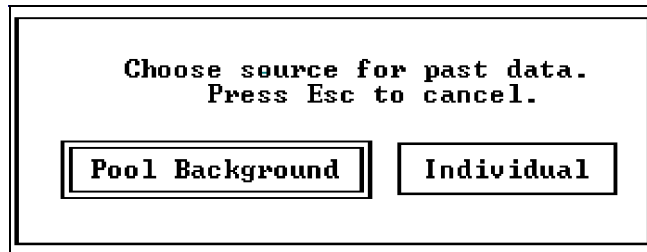


Figure 5-66. The Data Source dialog.

Pool Background

The Pool Background option builds a list comprised of observations from selected background wells. To construct an interval for pooled background observations use the left and right arrow keys to highlight the Pool Background option and press **<Enter>**.

Individual

The Individual option builds a list for selection from the observations from a single user specified well. To construct an interval around data from a single well or to set up an Intra-Well comparison use the left and right arrow keys to highlight the Individual option and press **<Enter>**. The Well Selection dialog shown in Figure 5-67 appears on your screen.

Well ID	Grad	Obs	Min	Max	Mean	Std Dev
BG-1	U	8	2.996	4.605	3.334	0.641
BG-2	U	8	2.996	4.787	3.504	0.731
CW-1	D	8	2.996	5.561	4.466	1.091
CW-2	D	8	2.996	4.700	3.295	0.617

Figure 5-67. The Well Selection dialog.

Use the up and down arrow keys to highlight the desired well and press **<Enter>**.

2. The Data Selection dialog appears on your screen as shown in Figure 5-68.

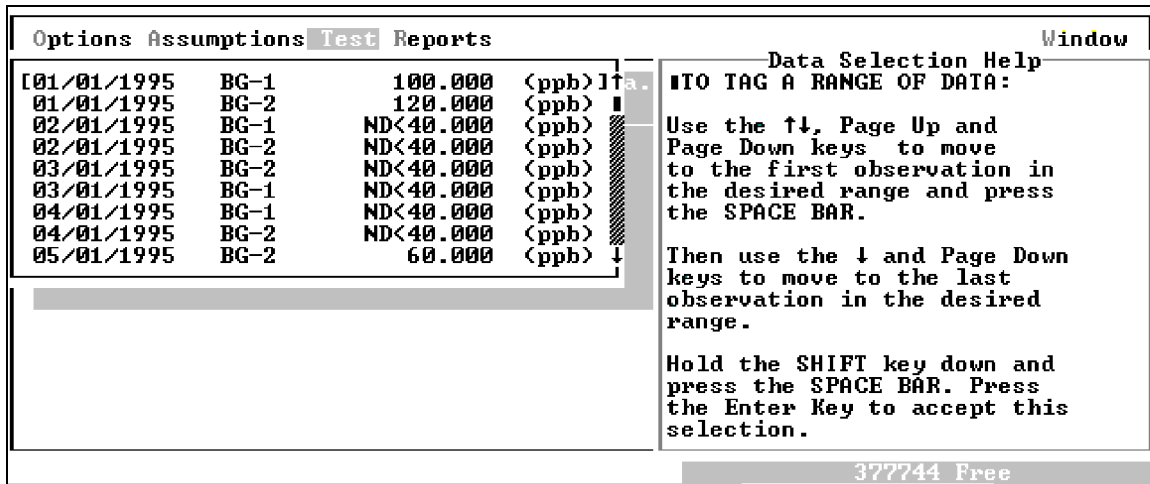


Figure 5-68. The Data Selection dialog.

Selecting a contiguous range of data

- Use the up and down arrow keys to bracket the first observation in the desired range and press the **<Space Bar>**.
- Use the up and down arrow keys to highlight the last observation in the desired range. Hold the **<Shift>** key down and press the **<Space Bar>**.

Tagging/Untagging individual observations

- Use the up and down arrow keys to highlight the observation that you want to include or exclude.
 - Press **<Space Bar>** to toggle the observation's selection state.
- To accept your selection press **<Enter>**.

Intra-Well Comparisons

- If you selected an Individual Well and did not select all the observations in the selected well the Type of Comparison dialog appears on your screen as shown in Figure 5-69.

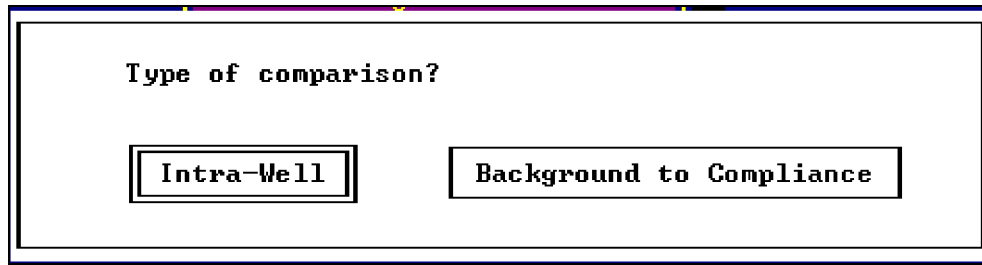


Figure 5-69. The Type of Comparison dialog.

To compare the computed interval to the unselected observations in the well highlight the Intra-Well option and press <Enter>.

To compare the computed interval to all compliance well observations highlight the Background to Compliance options and press <Enter>.

5.7.4 METHODS | INTERVALS | PREDICTION | PARAMETRIC

The Methods | Intervals | Prediction | Parametric option:

- Constructs a parametric Prediction Interval around user-specified data.

For statistical guidance consult Section 9.2 of *Statistical Analysis of Groundwater Monitoring Data: Unified Guidance*.

The instructions below assume that a data set is loaded.

1. At the GRITS Statistics menu press </>. This will take you to the top most level of the GRITS Statistics menu (Figure 5-12).
2. Press <M> to descend into the Methods menu.
3. Press <I> to descend into the Intervals menu.
4. Press <P> to descend into the Prediction menu.
5. Press <P> to execute the Parametric option. The Parametric Prediction Interval Menu appears on your screen as shown in Figure 5-70.

Parametric Nonparametric Parametric Prediction Intervals... F1 for Help	
Options Assumptions Test Reports Window	
FACILITY: Benchmark Datasets PCID: BENCHMARK	
PARAMETER: Chromium, total DETECTION LIMIT:	CAS NO.: 7440-47-3 UNITS: ppb
CURRENT DATASET INCLUDES OBSERVATIONS BETWEEN 01/01/1995 AND 08/01/1995	
DATA MODE: ORIGINAL INTERVAL TYPE: ONE-SIDED UPPER CONFIDENCE LEVEL (α): 95.00 %	
322496 Free	

Figure 5-70. The Parametric Prediction Interval Menu.

- The default settings for the Parametric Prediction Intervals method are listed in Table 5-17.

To change the Data Mode and Confidence Level follow the instructions for the Options pull-down menu in Table 5-18.

To change the Number of Future Samples (k) and Interval Type follow the instructions in Table 5-18 for the Interval pull-down menu.

Option	Default Value
Data Mode	The Parametric Prediction Interval defaults to the same Data Mode shown in the Scope window and set by <u>D</u> ataSet <u>S</u> cope Data <u>M</u> ode.
Confidence Level	95%
Future Samples (k)	1
Interval Type	One-Tailed Upper

Table 5-17. Default settings for the Parametric Prediction Interval Method.



Pull-Down	Menu Item	Description
 <p>Figure 5-71. The Options pull-down menu of the Parametric Prediction Intervals Menu.</p>	Data Mode...	<p>Allows you to select the scale (Original or Log Transform) that the Prediction Interval will be computed on.</p> <p>Upon selection the Data Scale pop-up will appear on your screen (Figure 5-49). Use the up and down arrow keys to highlight the desired scale and press <Enter>.</p> <p>If a Parametric Prediction Interval has already been computed and the scale is changed via the Data Mode.... option the Prediction Interval will automatically be re-computed on the selected scale.</p>
	Confidence Level	<p>Allows you to specify the Confidence Level for the Parametric Prediction Interval.</p>  <p>Figure 5-72. Confidence Level pop-up.</p> <p>Upon selection the Confidence Level pop-up shown in Figure 5-72 appears on your screen. Type in the desired Confidence Level and press <Enter>.</p> <p>If a Parametric Prediction Interval has already been computed and the Confidence Level is changed the Prediction Interval Limits will automatically be re-computed with the new Confidence Level.</p>
	Wells...	Allows you to toggle Well Selection Flags. See Section 5.5.3.2.
	Exit	Exits the Prediction Intervals menu.

Table 5-18. The Options pull-down of the Parametric Prediction Interval Menu.

Pull-Down	Menu Item	Description
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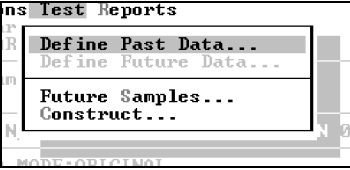
 <p>Figure 5-73. The <u>T</u>est pull-down menu.</p>	Define <u>P</u> ast Data...	Use the Define <u>P</u> ast Data... option to select the past data that the Prediction Interval will be computed on. See Section 5.7.6.1.
	Define <u>F</u> uture Data...	The Define <u>F</u> uture Data... option does not become active until you have selected past data with the Define <u>P</u> ast Data... option. See Section 5.7.6.2.
	Future <u>S</u> amples...	<p>The Future <u>S</u>amples... option is used to set the number of future samples (k).</p> <p>Upon execution of the Future <u>S</u>amples... menu item the Number of Future Samples dialog appears on your screen as shown in Figure 5-74.</p> <p>Enter the desired number of future samples and press <Enter>.</p> <p>If a Prediction Interval has already been computed the existing interval will automatically be re-computed for the new number of future samples (k).</p>
	<u>C</u> onstruct...	<p>Use the <u>C</u>onstruct... option to select the type of Prediction Interval to construct (i.e., one-sided upper, one-sided lower or two-sided).</p> <p>Upon selecting the <u>C</u>onstruct... option the Interval Type dialog appears (Figure 5-55). Use the up and down arrow keys to highlight the desired interval type and press <Enter>.</p>

Table 5-19. The Test pull-down of the Prediction Interval Menus.

7. Select the Define Past Data... option of the Test menu (Table 5-19) to select the data that the Prediction Interval Limits will be computed on. Follow the instructions in Section

5.7.6.1 to select past data. Upon selection of the past data the selected data will appear in the Past Data window as shown in Figure 5-75.

Past Data		
SAMPLE DATE	WELL ID	OBSERVATION
01/01/1995	BG-1	100.000
01/01/1995	BG-2	120.000
02/01/1995	BG-1	ND<40.000
02/01/1995	BG-2	ND<40.000
03/01/1995	BG-2	ND<40.000
03/01/1995	BG-1	ND<40.000

Figure 5-75. The Past Data window.

Use the up, down, left and right arrow keys to scroll through the data in the Past Data window.

Press <Enter> to return to the Parametric Prediction Interval Menu.

8. Select the Define Future Data... option of the Test menu. Follow the instructions in Section 5.7.6.2. The Parametric Prediction Interval results are displayed in the Future Data window (Figure 5-76).

Future Data	
Background to Compliance Well(s)	
ONE-TAILED UPPER PREDICTION INTERVAL:	
Observations(n):16	
Shapiro-Wilk(W):0.655	*
Critical W, $\alpha=0.01$:0.844	
Mean:39.063	<ppb>
Std Dev:32.466	<ppb>
DF:15.000	
Conf Level(1- α):0.950	
Future Samples:1	
t [1 - α , DF]:1.753	
k	
Kappa:1.807	
UL= 97.729	
LL=- ∞	

Figure 5-76. The Future Data window for the Parametric Prediction Interval method.

9. Use the up and down arrow keys to scroll through the Future Data window. Press <Enter> to return to the Parametric Prediction Interval Menu.

The statistics shown in the Future Data window are described in Table 5-20.

Statistic	Description
Observations(n)	The number of Past observations selected.

Shapiro-Wilk(W) or Shapiro-Francia(W')	For less than 50 past observations the Shapiro-Wilk(W) statistic. If 50 or more past observations are selected the Shapiro-Francia(W') statistic is computed. This value is flagged with an asterisk (*) if the data are not normally distributed at the 1% level of significance.
Critical $W, \alpha=0.01$ or Critical $W', \alpha=0.01$	Critical value of W or W' for n observations at the 1% level of significance.
Mean	Mean of the selected past observations.
Std Dev	Standard Deviation of the selected past observations.
DF	Degrees of Freedom
Conf Level(1- α)	Confidence Level
Future Samples	Number of Future Samples (k).
$t_{[1 - \frac{\alpha}{2}, DF]}$ for a one-sided interval $t_{[1 - \frac{\alpha}{2}, DF]}$ for a two-sided interval	Percentile of the Student's <i>t</i> Distribution
Kappa	Standard Deviation multiplier
UL	Upper Prediction Limit
LL	Lower Prediction Limit

Well Observations

The Well Observations used as Future Data are listed by well (Figure 5-77).

Future Data			
■ WELL:GW-1			
GW-1	01/01/1995	100.000	<pph>
GW-1	02/01/1995	ND<40.000	<pph>
GW-1	03/01/1995	260.000	<pph>*
GW-1	04/01/1995	150.000	<pph>*
GW-1	05/01/1995	40.000	<pph>
GW-1	06/01/1995	ND<40.000	<pph>
GW-1	07/01/1995	210.000	<pph>*
GW-1	08/01/1995	250.000	<pph>*

Figure 5-77. Well Observations compared to a one-sided upper Prediction Interval for k=2.

A dashed line separates each group of k observations. The Number of Future Samples (k) for which the Prediction Interval is estimating the probable range is set in the Future Samples option of the Test pull-down menu (Table 5-19).

Table 5-20. Summary statistics displays in the Future Data window for the Parametric Prediction Interval method.

10. Use the Reports | Print option to print the Parametric Prediction Interval results to a printer or ASCII file (Section 5.7.9).
11. Use the Reports | Display option to view a graphical representation of the Parametric Prediction Interval results (Figure 5-78). Observations that fall outside of the Prediction Interval are shown as asterisks (*).

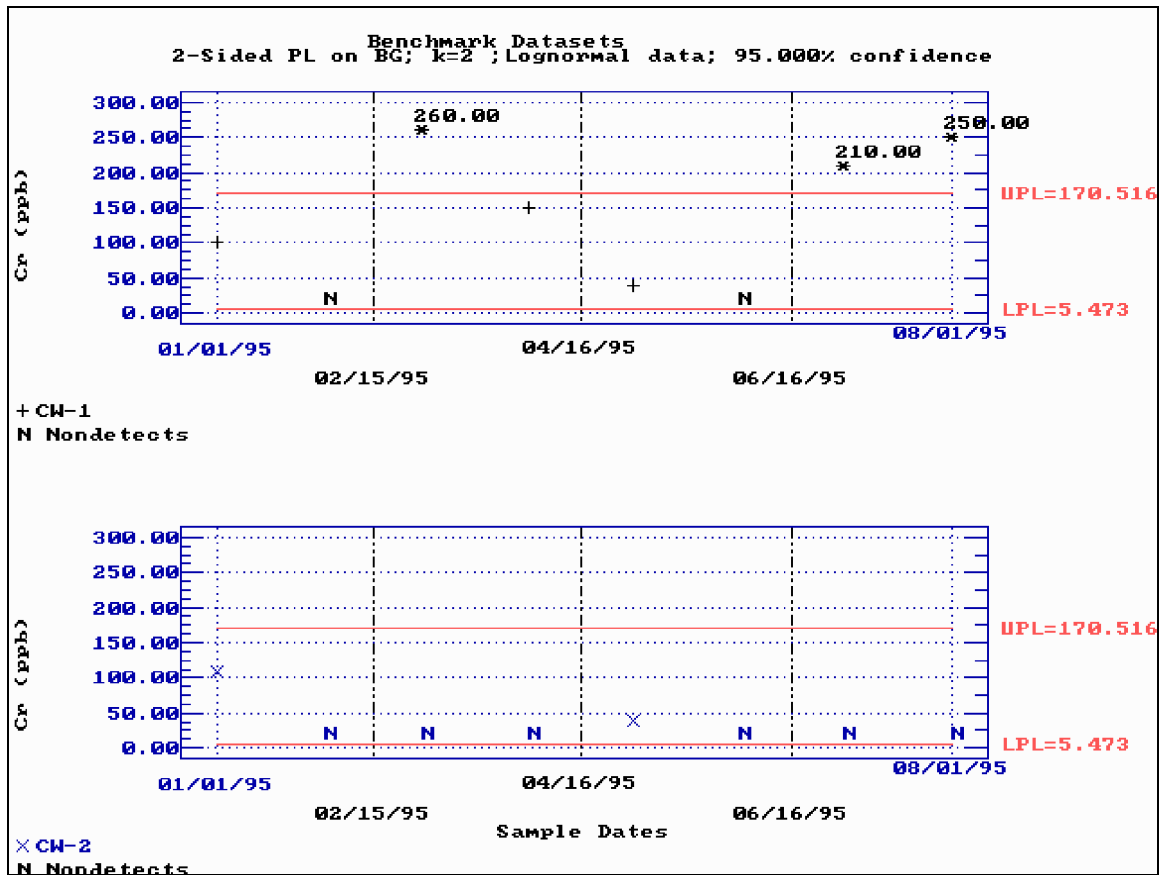


Figure 5-78. Upper Prediction Limit (UPL) and Lower Prediction Limit (LPL) from a two-sided Prediction Limit superimposed on scatter plots of observations from wells CW-1 and CW-2.

5.7.5 METHODS | INTERVALS | PREDICTION | NON-PARAMETRIC

The Methods | Intervals | Prediction | NonParametric option:

- Constructs a Non-parametric Prediction Interval around user-specified data.

For statistical guidance consult Section 9.2 of *Statistical Analysis of Groundwater Monitoring Data: Unified Guidance*.

The instructions below assume that a data set is loaded.

- At the GRITS Statistics menu press </>. This will take you to the top most level of the GRITS Statistics menu (Figure 5-12).
- Press <M> to descend into the Methods menu.

3. Press <I> to descend into the Intervals menu.
4. Press <P> to descend into the Prediction menu.
5. Press <N> to execute the NonParametric option. The Non-parametric Prediction Interval Menu appears on your screen as shown in Figure 5-79.

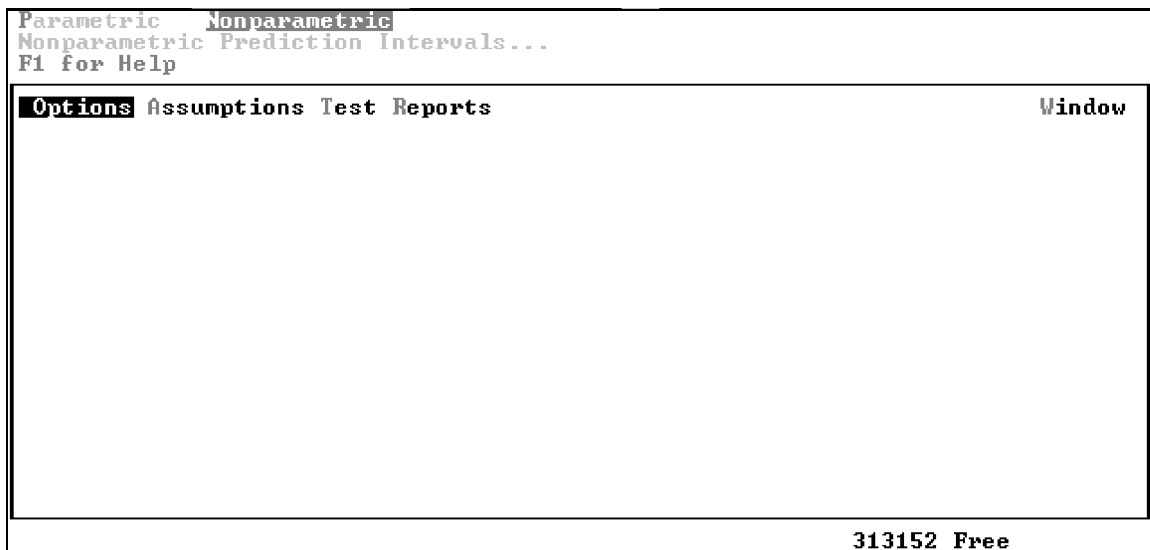


Figure 5-79. The Non-parametric Prediction Interval Menu.

6. The default settings for the Non-parametric Prediction Intervals method are listed in Table 5-21.

Option	Default Value
Confidence Level	95±10%
Future Samples (k)	1
Interval Type	One-Tailed Upper

Table 5-21. Default values for the Non-parametric Prediction Interval Method.

To change the desired Confidence Level follow the instructions for the Confidence Level option of the Options pull-down menu in Table 5-22.

To change the number of future samples (k) or the Interval Type follow the instructions for the Future Samples... and Construct... options of the Test pull-down menu in Table 5-19.

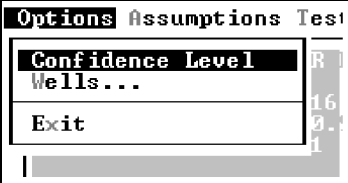

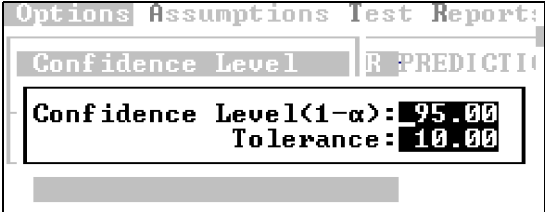
Pull-Down	Menu Item	Description
 <p>Figure 5-81. The Options pull-down menu.</p>	Confidence Level...	Set the desired Confidence Level and Tolerance.
	<p>Upon executing the Parameters option the message box shown in Figure 5-82 appears on your screen.</p>  <p>Figure 5-82. Message Box to inform users about Significance Levels in Non-parametric Intervals.</p> <p>Computation of the Non-parametric Prediction Interval is iterative. A list of possible Prediction Intervals is constructed based upon the user-specified background data. The approximate Confidence Level is computed for each interval in the list. The Interval that comes closest to meeting the desired Confidence Level is selected and used for comparisons.</p> <p>Press <Enter> to proceed to the Confidence Level dialog (Figure 5-83).</p>  <p>Figure 5-83. The Confidence Level dialog.</p> <p>Enter the desired Confidence Level and Tolerance press <Enter>.</p> <p>If a Non-parametric Prediction Interval has already been computed and the Confidence Level is changed the Prediction Interval will be re-computed for the selected Confidence Level.</p>	
	Wells...	Allows you to toggle Well Selection Flags. See Section 5.5.3.2.
	Exit	Exits the Non-parametric Prediction Intervals menu.

Table 5-22. The Options pull-down menu for the Non-parametric Prediction Intervals Menu.

7. Select the **Define Past Data...** option of the **Test** menu (Table 5-19) to select the data that the Prediction Interval Limits will be computed on. Follow the instructions in Section 5.7.6.1 to select past data. Upon selection of the past data the selected data will appear in the **Past Data** window as shown in Figure 5-75.

Use the up, down, left and right arrow keys to scroll through the data in the **Past Data** window.

Press **<Enter>** to return to the **Non-parametric Prediction Interval Menu**.

8. Select the **Define Future Data...** option of the **Test** menu. Follow the instructions in Section 5.7.6.2. The Parametric Prediction Interval results are displayed in the **Future Data** window (Figure 5-84).

Future Data		
■ONE-TAILED UPPER PREDICTION INTERVAL:		
Observations(n):16		
Conf Level(1-α):0.9500 ± 0.1000 (Approx.)		
Future Samples:1		
LOWER LIMIT	UPPER LIMIT	APPROX. CONF. LEVEL
0.000	120.000	94.118%
0.000	100.000	88.235%
0.000	65.000	82.353%
0.000	60.000	76.471%
0.000	60.000	70.588%
0.000	20.000	64.706%
0.000	20.000	58.824%
0.000	20.000	52.941%
0.000	20.000	47.059%

Figure 5-84. The **Future Data** window for the Non-parametric Prediction Interval method.

The statistics shown in the **Future Data** window are described in Table 5-23.

Statistic	Description
Observations(n)	Number of background observations used to compute the Prediction Interval Limits.
Conf Level(1-α)	Desired Confidence Level ± User Tolerance.
List of possible Prediction Intervals	<p>A list of all possible Prediction Intervals based on the user selected data is displayed. The interval selected for comparison to observations is shown in bright white. All other intervals are shown in yellow.</p> <p>The Approximate Confidence Level is displayed for each Prediction Interval in the list.</p>

Minimum number of background samples required to meet the desired Confidence Level	The minimum number of past data observations required to meet the desired Confidence Level is displayed.
UL	Upper Prediction Limit
LL	Lower Prediction Limit
Well Observations	<p>Remaining observations are listed by well. Observations that fall outside of the upper and lower Prediction Limits are flagged with an asterisk (*).</p> <p>A dashed line separates each group of k observations. The Number of Future Samples (k) for which the Prediction Interval is estimating the probable range for is set in the Future Samples option of the <u>T</u>est pull-down menu (Table 5-19).</p>

Table 5-23. Future Data window statistics for the Non-parametric Prediction Interval Methods.

9. Use the Reports | Print option to print the Parametric Prediction Interval results to a printer or ASCII file (Section 5.7.9).
10. Use the Reports | Display option to view a graphical representation of the Parametric Prediction Interval results (Figure 5-85). Observations that fall outside of the Prediction Interval are shown as asterisks (*).

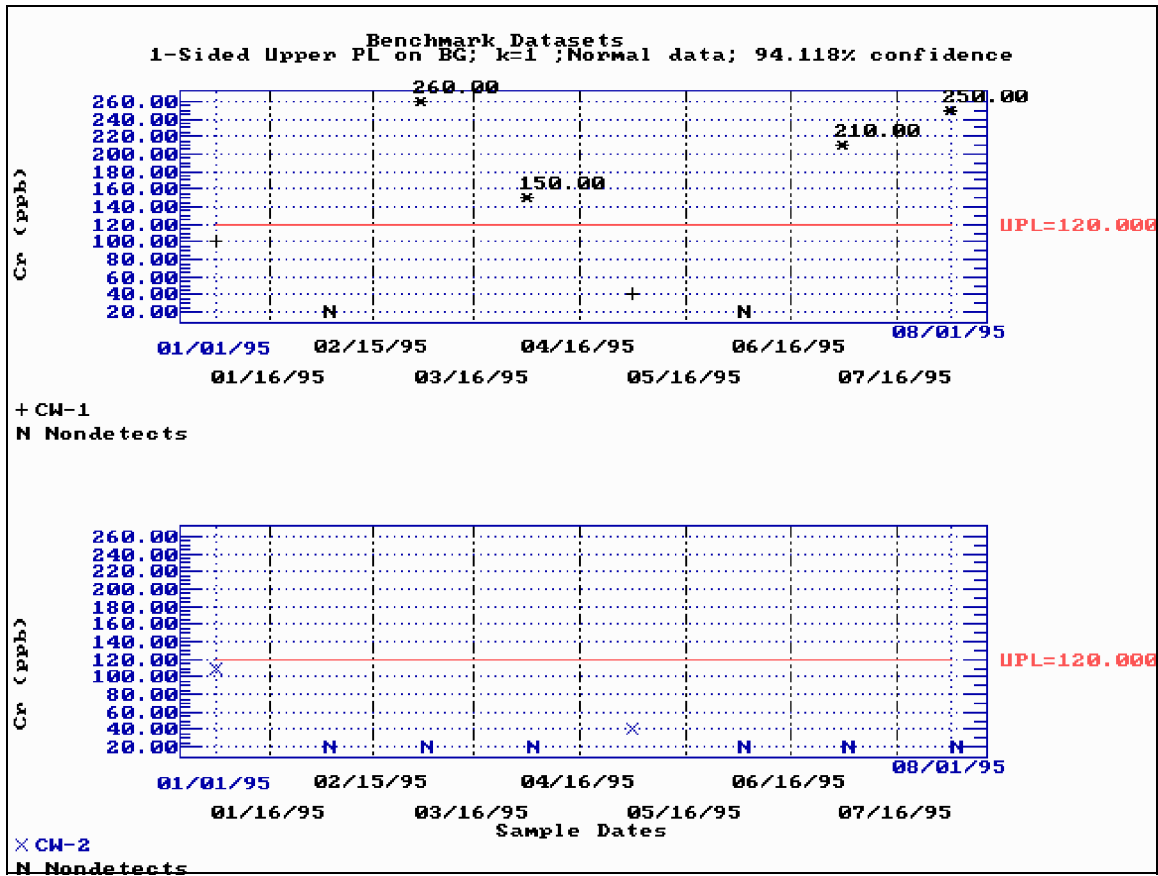


Figure 5-85. Upper Prediction Limit (UPL) from a one-sided upper Non-parametric Interval superimposed on scatter plots of observations from wells CW-1 and CW-2.

5.7.6 SELECTING PAST AND FUTURE DATA FOR PREDICTION INTERVALS

The Parametric and Non-parametric Prediction Interval methods in the **GRITS Statistics Intervals Module** use the same data selection dialogs to select the Past data to construct intervals around and the Future data for comparison.

5.7.6.1 Defining Past Data

Follow the instructions below for the **Define Past Data...** option of the **Test** pull-down menu.

1. The Data Source dialog shown in Figure 5-86 appears on your screen.

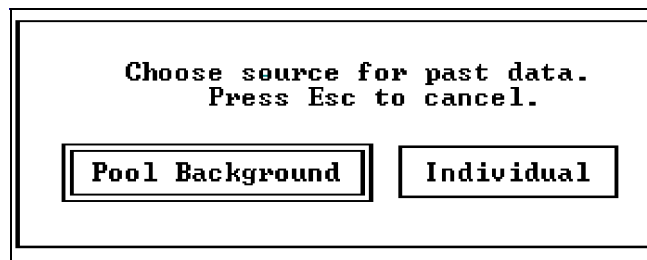


Figure 5-86. The Data Source dialog.

Pool Background

The Pool Background option builds a list comprised of observations from selected background wells. To construct an interval for pooled background observations use the left and right arrow keys to highlight the Pool Background option and press **<Enter>**.

Individual

The Individual option builds a list for selection from the observations from a single user specified well. To construct an interval around data from a single well to set up an Intra-Well comparison use the left and right arrow keys to highlight the Individual option and press **<Enter>**. The Well Selection dialog shown in Figure 5-87 appears on your screen.

Well ID	Grad	Obs	Min	Max	Mean	Std Dev
BG-1	U	8	2.996	4.605	3.334	0.641
BG-2	U	8	2.996	4.787	3.504	0.731
CW-1	D	8	2.996	5.561	4.466	1.091
CW-2	D	8	2.996	4.700	3.295	0.617

Figure 5-87. The Well Selection dialog.

Use the up and down arrow keys to highlight the desired well and press **<Enter>**.

2. The Data Selection dialog appears on your screen as shown in Figure 5-88.

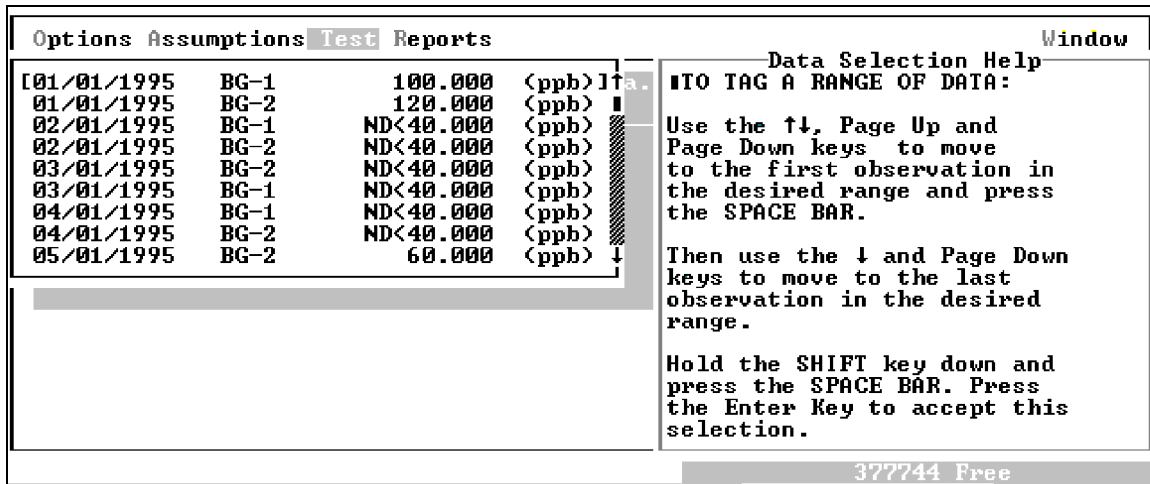


Figure 5-88. The Data Selection dialog.

Selecting a contiguous range of data

- Use the up and down arrow keys to bracket the first observation in the desired range and press **<Space Bar>**.
- Use the up and down arrow keys to highlight the last observation in the desired range. Hold the **<Shift>** key down and press the **<Space Bar>**.

Tagging/Untagging individual observations

- Use the up and down arrow keys to highlight the observation that you want to include or exclude.
 - Press **<Space Bar>** to toggle the observations selection state.
- To accept your selection press **<Enter>**.

5.7.6.2 Defining Future Data

If in the Define Past Data... session you have selected all pooled background observations or all observations in an individual well the Define Future Data... menu item computes the Prediction Interval and displays the results in the Future Data window.

If in the Define Past Data... session you selected some (not all) of the observations from an Individual Well, the Type of Comparison dialog appears on

your screen as shown in Figure 5-89.

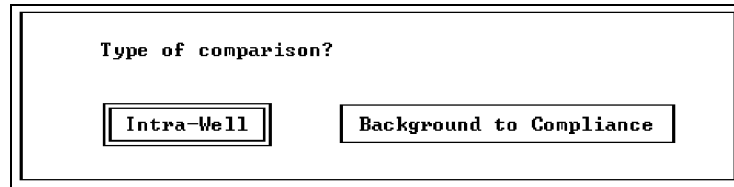


Figure 5-89. The Type of Comparison dialog.

To compare the remaining un-selected observations in the individual well to the Prediction Interval constructed on the selected data use the left and right arrow keys to highlight the Intra-Well option and press <Enter>.

To compare the Prediction Interval to Compliance Well observations use the left and right arrow keys to highlight the Background to Compliance option and press <Enter>.

5.7.7 METHODS | INTERVALS | CONFIDENCE | PARAMETRIC

The Methods | Intervals | Confidence | Parametric option allows you to:

- Compute a Parametric Confidence Interval around the Mean for comparison to a mean based groundwater protection standard (e.g., Alternate Concentration Limit, ACL).
- Compute a Parametric Confidence Interval around the Upper 95th Percentile for comparison to a risk-based GWPS (e.g., Acute-Risk, short term exposure MCL).

For statistical guidance consult Section 12 of *Statistical Analysis of Groundwater Monitoring Data: Unified Guidance*.

The instructions below assume that a data set is loaded.

1. At the GRITS Statistics menu press </>. This will take you to the top most level of the GRITS Statistics menu (Figure 5-12).
2. Press <M> to descend into the Methods menu.
3. Press <I> to descend into the Intervals menu.
4. Press <C> to descend into the Confidence menu.
5. Press <P> to execute the Parametric option of the Confidence menu. The Parametric Confidence Interval Menu appears as shown in Figure 5-90.



Figure 5-90. The Parametric Confidence Interval Menu.

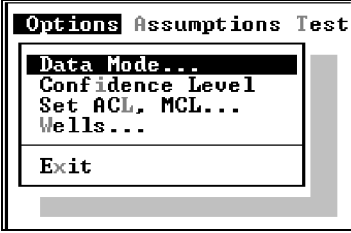
6. The default settings for the Parametric Confidence Interval method are shown in Table 5-24.

Option	Default Value
Data Mode	The Parametric Confidence Interval defaults to the same setting shown in the Scope window and set by the <u>D</u> ataSet <u>S</u> cope <u>D</u> ata <u>M</u> ode option.
Confidence Level	95%
ACL, MCL	The ACL and MCL default to the ACL and MCL specified for the parameter being tested.
Pooling	Individual Wells. Confidence Intervals are constructed for each well.
Interval Type	One-Tailed Lower

Table 5-24. The default settings for the Parametric Confidence Interval method.

To change the Data Mode, Confidence Level, ACL or MCL follow the instructions in Table 5-25 for the Options pull-down menu.

To change the Pooling or Interval Type follow the instructions for the Construct... option of the Test pull-down menu in Table 5-27.

Pull-Down	Menu Item	Description
 <p><i>Figure 5-91.</i> The <u>O</u>ptions pull-down menu.</p>	<u>D</u> ata Mode...	<p>Allows you to select the scale (Original or Log Transform) that the Confidence Interval will be computed on.</p> <p>Upon selection the Data Scale pop-up (Figure 5-49) will appear on your screen. Use the up and down arrow keys to highlight the desired scale and press <Enter>.</p>

If a Confidence Interval has already been computed the existing interval will automatically be re-computed on the selected scale.

Confidence Interval on the Mean

If the Log Transform scale is selected and a Confidence Interval on the mean is computed, Land’s formulas (See Section 12.1 of *Statistical Analysis of Groundwater Monitoring Data: Unified Guidance*) for computing the Confidence Interval on the log-normal mean are used. The implementation of Land’s formulas in the **GRITS Statistics Intervals Module** does not support all possible Confidence Levels. Therefore, if you are switching from the Original to the Log Transform scale and the currently selected Confidence Level is not supported you will be prompted to select a supported Confidence Level from a pop-up list as shown in Figure 5-92.

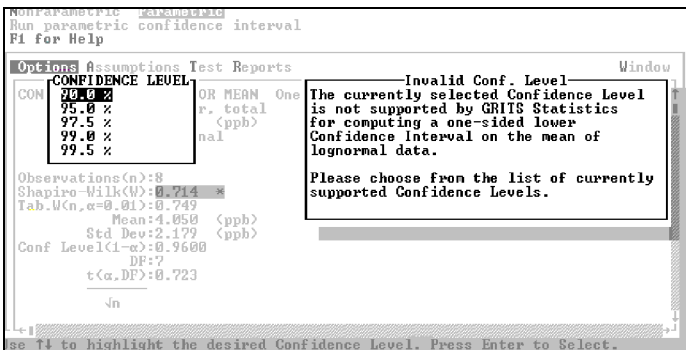


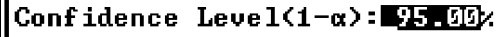
Figure 5-92. Pop-up list of supported Confidence Levels that appears after switching scales from original to log-transform.

Confidence Level

The Confidence Levels available for selection depend on the selected scale (i.e., original or log-transform), the interval-type (i.e., one-side or two-sided) and the parameter the interval is estimating bounds for (i.e., Mean or 95th Percentile).

The supported Confidence Levels are listed in Table 5-26.

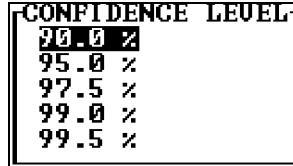
If you are setting the Confidence Level for a Confidence Interval around the mean computed on the original scale the **Confidence Level** dialog shown in Figure 5-93 appears on your screen. Enter the desired Confidence Level and press **<Enter>**.



Confidence Level(1-α): 95.00%

Figure 5-93. Confidence Level dialog to set the Confidence Level for a Confidence Interval around the mean on the original scale.

If you are setting the Confidence Level for a Confidence Interval around the log-normal mean or the 95th Percentile a pop-up list of supported Confidence Intervals will appear as shown in Figure 5-94. Use the up and down arrow keys to highlight the desired Confidence Level and press **<Enter>**.



CONFIDENCE LEVEL

- 90.0 %
- 95.0 %
- 97.5 %
- 99.0 %
- 99.5 %

Figure 5-94. Pop-up list of supported Confidence Levels for a one-sided Confidence Interval on the log-normal mean.

If a Confidence Interval has already been computed and the Confidence Level is changed the existing Confidence Interval is automatically re-computed with the new Confidence Level.


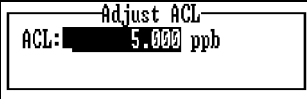
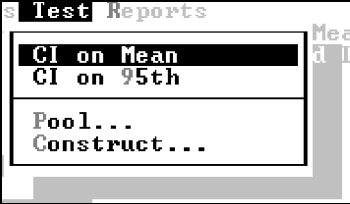
<p>Set ACL, MCL...</p>  <p>Figure 5-95. The Concentration Limit pop-up.</p>  <p>Figure 5-96. The Adjust Concentration Limit Value dialog.</p>	<p>The Set ACL, MCL... option allows you to edit the ACL or MCL that the Confidence Interval(s) are compared to.</p> <p>Upon selection you are prompted for the concentration limit you wish to edit as shown in Figure 5-95.</p> <p>Use the up and down arrow keys to select the desired concentration limit.</p> <p>Note: This implementation of GRITS Statistics uses the ACL for comparisons to Confidence Intervals around the mean and uses the MCL for comparisons to Confidence Intervals around the 95th Percentile.</p> <p>The Adjust Concentration Limit Value dialog appears on your screen as shown in Figure 5-96. Type in the desired value and press <Enter>.</p> <p>If a Confidence Interval has already been computed and the ACL or MCL is changed the comparison(s) are automatically refreshed for the new ACL or MCL.</p>
Wells...	Allows you to toggle Well Selection Flags. See Section 5.5.3.2.
Exit	Exits the Parametric Confidence Intervals menu.

Table 5-25. The Options pull-down menu for the Parametric Confidence Intervals method.

Parameter	Interval Type	Scale	Supported Confidence Levels
Mean	One-Sided	Original	<i>Not Restricted</i>
		Log Transform	90%, 95%, 97.5%, 99%, 99.75%
	Two-Sided	Original	<i>Not Restricted</i>
		Log Transform	80%, 90%, 95%, 98%, 99%, 99.5%
95 th %Tile	One-Sided	Both Scales	80%, 90%, 95%, 97.5%, 99%
	Two-Sided	Both Scales	60%, 80%, 90%, 95%, 98%

Table 5-26. Supported Confidence Levels for the Parametric Confidence Intervals method.

Pull-Down	Menu Item	Description
 <p>Figure 5-97. The Test pull-down menu.</p>	CI on <u>M</u> ean	The CI on Mean option computes the Confidence Interval around the mean. Results are displayed in the CI on Mean window.
	CI on <u>9</u> 5 th	The CI on 95 th computes the Confidence Interval around the 95 th Percentile. Results are displayed in the CI on 95%tile window.

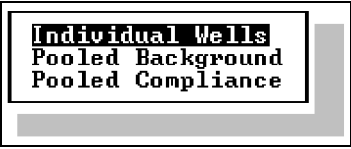
	<p><u>P</u>ool...</p>  <p>Figure 5-98. The Pool dialog.</p>	<p>The Pool... option allows you to specify the group(s) that Confidence Intervals are computed on.</p> <p>Upon selection the Pool dialog appears on your screen as shown in Figure 5-98.</p> <p>Select the Individual Wells option to construct Confidence Intervals for each well.</p> <p>Select the Pooled Background option to construct a single Confidence Interval around all pooled background observations.</p> <p>Select the Pooled Compliance option to construct a single Confidence Interval around pooled compliance well observations.</p> <p>Use the up and down arrow keys to highlight the desired pooling option and press <Enter>.</p> <p>If a Confidence Interval has already been computed and the Pool... option is changed the existing Confidence Interval will be replaced.</p>
	<p><u>C</u>onstruct...</p>	<p>Use the <u>C</u>onstruct... option to select the type of Confidence Interval to construct (i.e., one-sided upper, one-sided lower or two-sided).</p> <p>Upon selecting the <u>C</u>onstruct... option the Interval Type dialog appears (Figure 5-55). Use the up and down arrow keys to highlight the desired interval type and press <Enter>.</p>

Table 5-27. The Iest pull-down menu for the Confidence Interval methods.

7. The Parametric Confidence Intervals method in the **GRITS Statistics Intervals Module** will construct Confidence Intervals on the Mean for comparison with the ACL and Confidence Intervals on the 95th Percentile for comparison with the MCL.

Parametric CI on Mean

Execute the CI on Mean option of the Test menu to construct a Parametric Confidence Interval on the Mean. The computed Confidence Interval will appear in the CI on Mean window. The CI on Mean window for a Parametric Confidence Interval on the Mean for original data is shown in Figure 5-99 and the statistics shown for each confidence interval are described in Table 5-28.

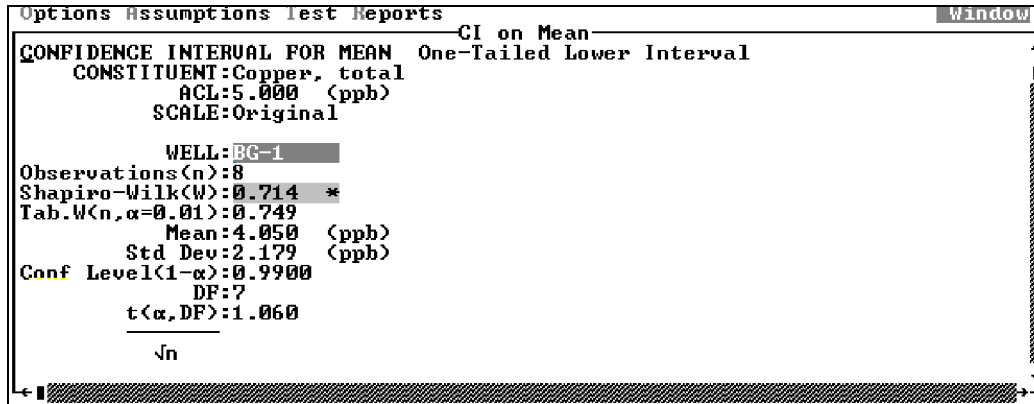


Figure 5-99. The CI on Mean window for Confidence Intervals computed on the original scale.

Statistic	Description
Observations(n)	Number of observations in the well or group.
Shapiro-Wilk(W) or Shapiro-Francia(W')	For less than 50 past observations the Shapiro-Wilk(W) statistic. If 50 or more past observations are selected the Shapiro-Francia(W') statistic is computed. This value is flagged with an asterisk (*) if the data are not normally distributed at the 1% level of significance.
Tab. W(n,α=0.01) or Tab. W'(n,α=0.01)	Critical value of W or W' for n observations at the 1% level of significance.
Mean	Mean
Std Dev	Standard Deviation
Conf Level(1-α)	Confidence Level
DF	Degrees of Freedom

for one-sided interval $\frac{t(\alpha, DF)}{\sqrt{n}}$ for a two-sided interval $\frac{t(\frac{\alpha}{2}, DF)}{\sqrt{n}}$	Standard Deviation Multiplier (Kappa).
UL	Upper Confidence Limit
LL	Lower Confidence Limit

Table 5-28. Statistics displayed in the **CI on Mean** window for each Parametric Confidence Interval on the Mean when the interval is computed on the original scale.